

1                    METHOD AND APPARATUS FOR ACCESSING ELECTRONIC

2                    DATA VIA A FAMILIAR PRINTED MEDIUM

3                    CROSS REFERENCE TO RELATED APPLICATIONS

4                    This application is a continuation-in-part of application  
5                    serial number 08/628,246, filed April 4, 1996.

6                    FIELD OF THE INVENTION

7                    The present invention relates generally to the electronic  
8                    media industry -- such as cable television (CATV), home shopping  
9                    services, on-line computer services, personal computer  
10                   applications, and CD-ROM-based multi-media applications -- and,  
11                   more particularly, to a method and apparatus for allowing a user  
12                   to access and make use of such electronic media services via a  
13                   device that makes use of a standard book, magazine or other  
14                   printed work.

15  
16                   BACKGROUND OF THE INVENTION

17                   It is a well-known fact that a large fraction of the  
18                   population is unfamiliar with the operation or use of modern  
19                   computer devices. This remains true despite significant advances  
20                   in user-interface technology -- such as mouses, windows, menus  
21                   and the like. It is commonly said that such technology makes  
22                   computers "user friendly." However, the modern

1 mouse/window/menu-based user-interface technology has been widely  
2 available for several years, and yet it still appears that this  
3 technology is not a panacea for computer-phobia. Indeed, studies  
4 have shown that a majority of VCR owners cannot operate the  
5 simple menu-based interface used to program their VCRs. Thus,  
6 there exists a great need for improved user-interface technology,  
7 if computer-based electronic media is to become as widely used  
8 and accepted as television or radio.

9 This need for improved user-interface technology will become  
10 even greater with the arrival of technology such as the presently  
11 planned "information superhighway," which will permit delivery of  
12 high-bandwidth (i.e., full-motion video rate) digital data into  
13 millions of homes via fiber optic, cable, RF, microwave or  
14 satellite links. Such technology will, in concept, permit  
15 instant delivery of a virtually limitless selection of  
16 commercial, informational, educational and entertainment  
17 programming at a user's request. However, without better user-  
18 interface technology, the average user may not be capable of  
19 enjoying the vast capabilities of such a system. Indeed, it is  
20 clear that the number of programming choices available to the  
21 user of such technology will be far greater than the number of  
22 choices involved in programming a VCR -- a task already

1 demonstrated to be too complicated for the average user of  
2 present-day user-interface technology.

3 In contrast to the difficulty many people encounter in using  
4 remote controls and other prior art computer interfaces, printed  
5 matter -- such as books and magazines -- represents an almost  
6 universally familiar and non-intimidating medium by which a user  
7 can acquire desired information. Even illiterate individuals  
8 incapable of reading text can nonetheless peruse pages of printed  
9 matter and appreciate the substance of flashy advertisements and  
10 the like. Thus, it would be highly desirable to provide a system  
11 with the information accessing capabilities of a modern CD-ROM or  
12 on-line computer system, and the user-interface simplicity of  
13 printed matter.

14 The prior art includes a class of devices known as "talking  
15 books" -- see, e.g., U.S. Patent Nos. 4,636,881 entitled TALKING  
16 BOOK WITH AN INFRARED DETECTOR USED TO DETECT PAGE TURNING,  
17 4,702,573 entitled VISUAL AND AUDIBLE ACTIVATED WORK AND METHOD  
18 OF FORMING SAME, 4,778,391 entitled SOUND-PRODUCING AMUSEMENT OR  
19 EDUCATIONAL DEVICES, 4,809,246 entitled SOUND ILLUSTRATED BOOK  
20 HAVING PAGE INDICATOR CIRCUIT, 4,990,092 entitled TALKING BOOK  
21 and 5,209,665 entitled INTERACTIVE AUDIO VISUAL WORK, all of  
22 which are incorporated herein by reference. Typically, these

1 "talking books" consist of a book with various sensors which --  
2 when activated by touching, page turning, etc. -- cause a sound  
3 generating means (also embedded within the book) to produce or  
4 replay particular sounds. Talking books thus provide an  
5 interface for allowing an unsophisticated user (i.e., a child) to  
6 access a very primitive computer (i.e., the sound generating  
7 means embedded within the book) via familiar printed matter  
8 (i.e., the book with embedded sensors). Importantly, however,  
9 talking books do not provide a means for interfacing with modern  
10 electronic media -- such as cable television (CATV), home  
11 shopping services, on-line computer services, CD-ROM-based multi-  
12 media applications, interactive TV or home computer applications.

13 One approach to interfacing with these modern electronic  
14 media is the "simulated book" -- see, e.g., U.S. Patent No.  
15 4,855,725, entitled MICROPROCESSOR BASED SIMULATED BOOK,  
16 incorporated herein by reference. The "simulated book" is in  
17 essence a book-size intelligent graphics terminal. Unlike the  
18 talking books, the simulated book is not a self-contained system,  
19 but rather transmits commands to and receives data from a CD-ROM  
20 equipped personal computer via a wireless link. Thus, the  
21 programming that the simulated book can access is not limited to  
22 that which can be stored in embedded memory devices, as with the

1 talking books. Importantly, however, the user-interface provided  
2 by the simulated book is essentially the conventional computer  
3 interface -- i.e., keys, pointer, menus, etc. Therefore, a  
4 computer-phobic user will likely still find the simulated book  
5 intimidating and inaccessible.

6 A disadvantage of both the talking book and simulated book  
7 technologies is that both include relatively costly electronics -  
8 - i.e., microprocessors, memory, display devices, etc. -- as a  
9 part of the "book." Thus, these technologies cannot be  
10 effectively used to create a "throw-away" interactive magazine,  
11 newspaper or advertising brochure.

12 Thus, there remains a need for a method and apparatus for  
13 accessing the vast resources of electronic media using a device  
14 as familiar and non-intimidating as printed matter. There  
15 remains a further need for such a method and apparatus which  
16 utilizes a low cost, throw-away printed matter.

## 17 18 SUMMARY OF THE INVENTION

19 One object of the present invention is a method and  
20 apparatus for allowing a user to access electronic media via a  
21 printed matter.

22 Another object of the invention is a method and apparatus

1 for allowing a user to access electronic media relating to, or  
2 expanding upon, material presented in the printed matter.

3 Another object of the invention is a low cost, throw-away  
4 printed matter useful in connection with other objects of the  
5 invention.

6 Still another object of the invention is an improved method  
7 of providing electronic media services.

8 Yet another object of the invention is an intelligent  
9 controller for use in connection with the invention.

10 In accordance with one embodiment, the invention comprises:  
11 (i) a printed matter having at least one sensor and a transmitter  
12 associated therewith; and (ii) an intelligent controller having a  
13 receiver and a means for accessing programming material. A user  
14 triggers said sensor through interaction with said printed  
15 matter, for example, by touching a particular spot on a page or  
16 by turning a page. In response to the triggering of said sensor,  
17 the transmitter sends a signal indicative of said sensor. The  
18 receiver receives said signal and, in response thereto, the  
19 intelligent controller executes a pre-programmed command related  
20 to accessing or controlling electronic media or programming. For  
21 example, when the user triggers a sensor associated with an  
22 advertisement in the printed matter, the intelligent controller

1 may, in response, send a signal via a telephone line, cable  
2 connection, or wireless modem or cellular link to a remote video  
3 server, and thereby cause a promotional program to appear on the  
4 user's television.

5 In accordance with another embodiment, the invention  
6 comprises: (i) a printed matter having at least one machine-  
7 recognizable feature -- such as a bar code or magnetic strip (or  
8 any commonly used printed indicia, such as a printed character,  
9 symbol or pictorial icon), (ii) a feature recognition unit having  
10 a means for recognizing said feature and a transmitter, and (iii)  
11 an intelligent controller having a receiver. The user directs  
12 the feature recognition unit to a feature on said printed matter.  
13 In response, said recognition unit transmits a signal indicative  
14 of the identity of the particular feature. The receiver receives  
15 said signal and the intelligent controller, in response thereto,  
16 executes an appropriate pre-programmed command.

17 In accordance with another embodiment, the invention  
18 comprises: (i) a printed matter having at least one machine-  
19 recognizable feature and (ii) an intelligent feature recognition  
20 unit having means for recognizing said feature, means for  
21 associating said recognized feature with a command, and means for  
22 issuing said command over a wireless link. In use, the user

1 directs said intelligent feature recognition unit at a feature on  
2 said printed matter. In response, said intelligent recognition  
3 unit associates said feature with a pre-programmed command and  
4 issues a pre-programmed command sequence over a wireless data  
5 link to control or access electronic media services. The command  
6 may, for example, be transmitted -- via an infrared (IR) or  
7 ultrasound link -- to a CATV control box in the same room, or --  
8 via a cellular or satellite link -- to the CATV company office.

9 In accordance with another embodiment, the invention  
10 comprises a printed matter having: (i) at least one sensor, (ii)  
11 a control module and (iii) a transmitter associated therewith.  
12 In response to the triggering of said sensor, said control module  
13 directs the transmitter to transmit a command related to  
14 accessing or controlling an electronic media service.

15 Other aspects of the invention relate to methods of  
16 providing, accessing or utilizing electronic media services. In  
17 accordance with one such aspect, the invention involves: (i)  
18 providing a printed matter having at least one sensor associated  
19 therewith, (ii) providing an intelligent controller which, in  
20 response to the triggering of said sensor, performs a pre-  
21 programmed command, and (iii) executing said pre-programmed  
22 command to access or control an electronic media.



1 Another aspect of the invention involves a method of  
2 providing electronic media services, which includes the steps of:  
3 (i) providing printed matter to a potential customer and (ii)  
4 pre-programming an intelligent controller to access or control an  
5 electronic media service in response to an event wherein the  
6 customer interacts with the printed matter in a particular  
7 manner. Advantageously, said printed matter comprises a low  
8 cost, throw-away publication.

9 In accordance with another aspect of the invention, an  
10 improved method of providing shop-at-home services includes the  
11 steps of: (i) providing to the customer a printed catalogue  
12 having at least one sensor or machine-recognizable feature  
13 associated therewith, (ii) programming a controller to execute a  
14 pre-programmed command in response to an event wherein the  
15 customer interacts with said sensor or feature, and (iii)  
16 providing a service -- e.g., displaying promotional programming  
17 on the customer's television, contacting the customer by  
18 telephone, establishing a computer "chat" link, etc. -- by  
19 telephone, cable, or wireless link in response to the execution  
20 of said command.

21 Another aspect of the present invention relates to an  
22 improved method of instruction, including the steps of: (i)

1 providing an instructional printed matter -- such as a textbook,  
2 cookbook, children's book or manual -- having at least one sensor  
3 or machine-recognizable feature associated therewith, (ii)  
4 providing a means, distinct from said textbook or other printed  
5 matter, for executing a pre-programmed command in response to an  
6 event wherein a reader interacts with said sensor or feature, and  
7 (iii) in response to said command, causing or controlling: (a)  
8 the electronic delivery or presentation of information related to  
9 that in the textbook or other printed matter; and/or (b) the  
10 establishment of a communication link to a live tutor or  
11 consultant familiar with the subject matter contained in the  
12 instructional printed matter.

13 Another aspect of the invention relates to a low cost,  
14 throw-away printed matter -- including at least one machine-  
15 recognizable feature -- adapted for use in connection with the  
16 invention.

#### 17 18 BRIEF DESCRIPTION OF THE DRAWINGS

19 The above -- as well as other -- aspects, objects and  
20 features of the present invention will be described in the  
21 Detailed Description below, which is intended to be read in  
22 conjunction with the following set of drawings, in which:

1 Fig. 1 depicts an embodiment wherein the display unit  
2 is embedded within the printed matter;

3 Fig. 2 depicts an embodiment of the invention wherein  
4 electronic media is presented on a user's TV set;

5 Fig. 3 depicts an embodiment of the invention wherein  
6 programming material is accessed from a remote  
7 source;

8 Fig. 4 depicts an embodiment of the invention which  
9 includes a feature recognition unit;

10 Fig. 4a depicts an embodiment of the invention wherein  
11 the feature recognition unit provides an interface  
12 between the display unit and a remote source of  
13 programming material;

14 Fig. 5 depicts an embodiment of the invention adapted  
15 for presentation of musical programming;

16 Fig. 5a depicts an alternative embodiment of the  
17 invention adapted for presentation of musical  
18 programming;

19 Fig. 6 depicts an embodiment of the invention wherein  
20 the display unit comprises a personal computer;

21 Fig. 6a depicts an embodiment of the invention wherein  
22 the user employs a hand-held scanner/pointer

1 device to select features associated with a  
2 printed matter and to interface with an  
3 intelligent controller or personal computer;  
4 Fig. 6b depicts an alternative embodiment of the  
5 invention wherein the user employs a separately  
6 attached trackball mouse and hand-held scanner  
7 device to select features associated with a  
8 printed matter and to interface with an  
9 intelligent controller or personal computer;

10 Fig. 6c depicts another embodiment of the invention  
11 wherein the user employs a separately attached  
12 trackball mouse and digital camera device to  
13 select features associated with a printed matter  
14 and to interface with an intelligent controller or  
15 personal computer;

16 Fig. 6d depicts another embodiment of the invention  
17 wherein the user employs a microphone set up to  
18 interface with an intelligent controller or  
19 personal computer which contains voice recognition  
20 software to select features associated with a  
21 printed matter;

22 Fig. 6e depicts yet another embodiment of the invention

1 wherein the user employs a traditional keyboard  
2 set up to interface with an intelligent controller  
3 or personal computer for manual entry to select  
4 features associated with a printed matter;

5 FIG. 6f depicts another embodiment of the present  
6 invention in which a scanable magnetic strip is  
7 set up to interface with an intelligent controller  
8 or personal computer equipped with a magnetic card  
9 reader to select features associated with a  
10 printed matter; and

11 Fig. 7 depicts an embodiment of the invention adapted  
12 for shop-at-home applications.

13  
14 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

15 In this section, the various preferred embodiments of the  
16 invention are described from two general perspectives. The  
17 first, a "functional" perspective, focuses on the contemplated  
18 interactions between the user and the various components -- i.e.,  
19 the printed matter, controller, display unit, etc. -- of the  
20 invention. This functional description provides the insight  
21 needed to implement the software or firmware used in connection  
22 with the invention. The second perspective, the "apparatus"

view, describes the various technologies that can be used to implement the individual components of the present invention.

#### THE FUNCTIONAL PERSPECTIVE

Reference is now made to Fig. 1, which depicts an embodiment of the invention comprising a printed matter 1 in communication (preferably wireless) with a data server 2.

Printed matter 1 includes at least one sensor 3 and a controller, which preferably includes a microprocessor 4. A stiff or flexible page 5 (any page within a book) holds a display screen 6.

Printed matter 1 can take the form of a book, magazine, manual, musical score, catalog, advertisement, newspaper, telephone or electronic service directory, or other like means. The controller -- including microprocessor 4 -- is preferably embedded within the spine or any other page of printed matter 1.

Display screen 6 can be an LED display, a passive or active matrix LCD display or other like means, and may also have an audio transducer associated therewith.

Sensor 3 is preferably touch sensitive, but can also be a page sensor or a combination of touch and page sensor, as described below. In response to a user's touch, microprocessor 4 causes programming material to be retrieved from data server 2

1 and displayed on screen 6. Data communication between server 2  
2 and microprocessor 4 may operate via RF cellular, microwave, IR,  
3 optical, conductive, telephonic or CATV links, or any combination  
4 of these or other like means.

5 Reference is now made to Fig. 2, which depicts an  
6 alternative embodiment of the invention comprising a printed  
7 matter 21, an intelligent controller 24 and display unit 25.  
8 Printed matter 21 includes at least one sensor 22 and a  
9 transmitter 23. In response to a user's actuation of sensor 22,  
10 transmitter 23 transmits a coded signal indicative of the  
11 identity of the actuated sensor. A receiver 26 in intelligent  
12 controller 24 receives the coded signal. Controller 24 then  
13 identifies the actuated sensor, and initiates display of  
14 appropriate programming material on display unit 25 (which can be  
15 a TV set or any other means for audio or audiovisual  
16 presentation, including but not limited to a personal computer).  
17 Programming material preferably derives from a mass storage  
18 device -- e.g., a magnetic disk, CD-ROM, ROM, flash RAM, PCMCIA  
19 card or other memory means -- associated with intelligent  
20 controller 24 (or with display unit 25). As used herein, the  
21 term "memory means" shall also include future storage  
22 technologies, such as the recently announced multi-layer CD-ROMs

1 being developed by IBM. See "New I.B.M. Laser Method Stacks Data  
2 on Disks," New York Times, May 13, 1994.

3 Reference is now made to Fig. 3, which depicts an embodiment  
4 of the invention in which intelligent controller 31 derives  
5 programming material from a remote server 30. Controller 31  
6 includes means for accessing a remote server 30 of programming  
7 material, and preferably further includes means for decompressing  
8 compressed programming material received from server 30. In  
9 response to a coded signal received by receiver 26, intelligent  
10 controller 31 sends an appropriate command to server 30 to select  
11 and initiate transfer of appropriate programming material.  
12 Controller 31 then receives programming material from remote  
13 server 30 and prepares (e.g., decompresses, if necessary) the  
14 material for presentation on display unit 25. As with  
15 conventional pay-per-view CATV services and on-line computer  
16 services, the user is billed according to the volume and/or  
17 nature of programming material requested.

18 Reference is now made to Fig. 4, which depicts an embodiment  
19 of the invention including a printed matter 40, a feature  
20 recognition unit 42, an intelligent controller 31, a server 30  
21 and a display unit 25. Printed matter 40 includes at least one  
22 machine-recognizable feature 41 in the printed work, such as a



1 bar code, invisible bar code, magnetic code, printed character,  
2 symbol or pictorial icon, or other feature.

3 Feature recognition unit 42 is a hand-held device and  
4 includes means 44 for recognizing feature 41, a transmitter 45  
5 and an optional user actuation switch 43. The user directs  
6 recognition unit 42 at a feature and depresses actuation switch  
7 43. In response thereto, means 44 for recognizing "reads" (i.e.,  
8 for a printed feature, scans and identifies) the feature 41, and  
9 transmitter 45 transmits a coded signal indicative of the  
10 identity of feature 41. The operation of controller 31, server  
11 30 and display unit 25 is otherwise identical or similar to the  
12 Fig. 3 embodiment.

13 Still referring to Fig. 4, use of embedded features 41 -- as  
14 opposed to sensors -- lowers the fabrication cost of printed  
15 matter 40. Advantageously, printed matter 40 can be a low cost,  
16 throw-away publication.

17 An identification code generated either by recognition unit  
18 42 or intelligent controller 31 allows the user to be billed for  
19 his/her use of transmitted material by server 30 and, for  
20 commercial applications, allows the advertiser to identify the  
21 potential customer.

22 Reference is now made to Fig. 4a, which depicts an

1 embodiment of the invention in which the functions of the  
2 intelligent controller are integrated into a recognition/control  
3 unit 46. Unit 46 includes means 44 for recognizing feature 41  
4 and means 48 for accessing -- preferably via a cellular RF link -  
5 - programming material associated with server 30. In addition,  
6 recognition/control unit 46 optionally includes a microprocessor.  
7 Either recognition/control unit 46 or display unit 47 may include  
8 means for decompressing compressed programming material.

9 Reference is now made to Fig. 5, which depicts an embodiment  
10 of the invention adapted for musical applications. The  
11 embodiment includes a printed musical score 50, an electronic  
12 baton 51, a music controller 55 and an audio/audiovisual player  
13 56. Using baton 51, the user directs a recognition means 52 --  
14 which can be either a CCD camera or a magnetic detector -- at a  
15 particular portion 57 of printed score 50. Transmitter 53 then  
16 transmits a coded signal indicative of the selected portion 57.  
17 Music controller 55, in response to the coded signal, directs the  
18 presentation of appropriate audio or audiovisual programming on  
19 player 56. Music controller 55 may include a means for storing  
20 programming material -- such as ROM, CD-ROM, flash RAM, PCMCIA  
21 card or other memory means -- or an electronic musical  
22 synthesizer, or both.

1           Reference is now made to Fig. 5a, which depicts an  
2 alternative embodiment of the invention directed to musical  
3 applications. In Fig. 5a, music controller 55a retrieves  
4 programming material from a remote data server 57. Using a  
5 remote server permits continuous updating of programming  
6 material, such as replacing one performance or opera company with  
7 another. Either player 56 or controller 55a preferably includes  
8 means for decompressing compressed programming material received  
9 from server 57.

10           Reference is now made to Fig. 6, which depicts an embodiment  
11 of the invention utilizing a personal computer to access and  
12 display electronic programming material. In this embodiment,  
13 portions of the personal computer provide the functions of the  
14 previously-described intelligent controller, while other portions  
15 of the computer provide the functions of the display unit. The  
16 scope of this invention should not be limited to the traditional  
17 notions of Personal Computers. The present invention will find  
18 use in conjunction with more non-traditional applications such as  
19 WEB-TV®, Video Phones, as well as other chip based technologies.  
20 An interface unit 60 includes a receiver 26 for receiving a coded  
21 signal from a transmitter 23, representative of an actuated  
22 sensor 22 (or, in an alternative embodiment which includes a

1 feature recognition unit, from the feature recognition unit  
2 indicative of the selected feature) on printed matter 21.  
3 Interface unit 60 connects to personal computer 61 by any  
4 conventional means, such as an I/O port, card slot, etc.  
5 Personal computer 61 monitors the interface unit 60, and displays  
6 (or controls the display of) appropriate programming material  
7 selected by the user through his/her interaction with printed  
8 matter 21.

9 Programming material can be stored on personal computer 61 -  
10 - on a ROM, CD-ROM, flash RAM, PCMCIA card, or other disk/card  
11 supplied along with printed matter 21 -- or accessed from a  
12 remote data server 62.

13 Reference is now made to Fig. 6a, which shows an embodiment  
14 of the invention wherein a user employs a hand-held recognition  
15 device 67 to: (i) select programming material associated with a  
16 feature 41 on a printed matter 40; and (ii) control or interact  
17 with a personal computer 65 during the presentation and/or  
18 execution of the programming material. The recognition device 67  
19 may be comprised of one of many possible devices already in use  
20 within the computer and electronics industry.

21 The preferred embodiment may utilize a scanner/mouse which is  
22 described in detail in U.S. Patent No. 4,804,949, entitled HAND-

1 HAND-HELD OPTICAL SCANNER AND COMPUTER MOUSE, which is  
2 incorporated herein by reference. The Fig. 6a embodiment  
3 provides at least two modes of interaction for the use of the  
4 Scanner/Mouse:

5 (i) Scan Mode:

6 In this mode, scanner/mouse 67 operates as a  
7 scanner. The user points scanner/mouse 67 at a  
8 feature 41 in a printed matter 40 and depresses a  
9 switch to cause the feature to be scanned.  
10 Personal computer 65 receives the scanned image,  
11 decodes it, and executes a pre-programmed command  
12 in response. Execution of the pre-programmed  
13 command may, for example, cause personal computer  
14 65 to fetch an interactive software program from a  
15 centralized data bank 62, and begin execution of  
16 the fetched software. Once the fetched software  
17 begins executing, scanner/mouse 67 may be placed  
18 into mouse/trackball mode, in order to support  
19 interaction between the user and personal computer  
20 65.

21 (ii) Mouse/Trackball Mode:

22 In this mode, scanner/mouse 67 operates as a

1 normal X-Y movement sensor, such as a mouse or  
2 trackball. Thus, this mode is useful to control  
3 conventional graphical interface functions, such  
4 as menus, windows, icons, cursors, video games,  
5 etc. Those skilled in the art will appreciate  
6 that this mode can provide any or all features  
7 typically found in modern graphical user  
8 interfaces.

9 The scanning function of the mouse may in the alternative be  
10 accomplished by the utilization of a bar code or other symbol  
11 laser scanning device incorporated within the hand-held unit 67.  
12 This invention is commonly used in grocery stores, and automated  
13 warehousing applications to price, and inventory goods. These  
14 scanners may be manufactured as a single unit with the trackball  
15 mouse of the PC 65 or alternatively may be employed as a separate  
16 device 69 with separately attached trackball mouse 64 as shown in  
17 FIG. 6b. As described in greater detail in U.S. Patent No.  
18 4,387,297, entitled PORTABLE LASER SCANNING SYSTEM AND SCANNING  
19 METHODS, these laser scanning devices 69 have a trigger within  
20 the device which initiates a repetitive scanning of each object  
21 bearing a symbol 41, and an indicator displays when the reading  
22 of that particular object has been completed. The recognition of

1 the symbol 41 is accomplished by the generation of a miniature  
2 light beam from the unit which is reflected in varying intensity  
3 depending on the qualities of the symbol 41. A sensing means  
4 within the unit detects the intensity of the light reflected from  
5 the symbol 41. The detecting means then generates an electrical  
6 signal indicative of the detected intensity of the light. A  
7 signal processing means then interprets the electrical signals to  
8 generate data descriptive of the symbol. The printed matter 40  
9 would be affixed with bar codes or other symbols 41 which could  
10 be read with the laser scanning device 69. The user would be  
11 directed to place the scanning portion of the device upon the  
12 symbol 41 and depress the trigger at appropriate times while  
13 reading or viewing the printed matter 40. The symbol 41 once  
14 scanned and processed would deliver a corresponding digital  
15 command, or reference to the software of the PC 65 working in  
16 coordination with the scanning device 69.

17 An additional peripheral device which may be employed to  
18 recognize symbols could be the digital camera 63 shown in FIG.  
19 6c. The digital camera 63 has gained popularity over recent  
20 years, and would have the advantage in this application of  
21 already being available to consumers who have either purchased it  
22 for its picture quality digital images, or for those who would be

1 interested in the cameras multi-functional use including this  
2 application. The digital camera 63 employs solid state sensing  
3 devices such as a charged coupled device to record images. The  
4 optical images which are recorded are then converted to discreet  
5 electric signals, which are then stored in various memory  
6 devices. The images may then be recalled from the memory device  
7 to be displayed, printed, or otherwise manipulated. One of the  
8 applications of the digital camera 63 is in the downloading of  
9 digital images to personal computers 65. The digital camera 63  
10 could therefore be used to download images of symbols 41 within  
11 reading materials 40 to the user's PC 65. Symbol processing  
12 software on the PC 65 could then interpret symbols downloaded  
13 from the digital camera 63 or its memory, and the PC 65 program's  
14 code logic would thereby trigger corresponding functions of PC  
15 65.

16 The triggering of the functions of PC 65 could also be  
17 initialized by verbal commands 58a from the user 58, as shown in  
18 FIG. 6d. The PC 65 could be affixed with a microphone 59. As the  
19 user 58 reads or works with a printed material 40 she could be  
20 instructed to pronounce verbal commands 58a into the microphone  
21 59 by feature 41 in the printed matter 40. The PC 65 would then  
22 have voice recognition software which would interpret the verbal



1 commands 58a from the printed matter 40 to access the programing  
2 material by, for example running applications which correspond  
3 with the commands.

4 In yet another alternative embodiment of the invention the  
5 feature 41 of printed matter 40 could also be manually entered  
6 into the PC 65 by way of a traditional keyboard 68 shown in FIG.  
7 6e. Users of the printed matter 40 who, for example, are reading  
8 advertisements, or working through a tutorial would be directed  
9 to manually input codes or word commands (feature 41) into the PC  
10 65 by way of a keyboard 68. The command would then, similar to  
11 other sensing devices, initialize a program or PC function which  
12 would operate in concert with the printed matter 40.

13 In each of the configurations of this invention described in  
14 FIGs. 6a-6f, PC applications may be retrieved from PC interfaces  
15 62 such as CD ROM drives, hard drives, PCMCIA cards, Flash RAM,  
16 web interfaces, or any other addressable memory device which the  
17 PC has access too.

18 The coded information might also be transferred to the  
19 computer through a scanable magnetic strip 41a as shown in figure  
20 6f. Known magnetic strip technology, used such as that credit and  
21 debit cards, has information as fixed electronic data embedded on  
22 the surface of the card. The PC 65 will have a magnetic card

1 reader 49 connected to one of its external ports. The printed  
2 matter 40 will direct the user to read the magnetic strip 41a  
3 into the reader 49. The information embedded on the magnetic  
4 strip will provide commands to the PC 65 to access programing  
5 material by directing currently running applications, or to  
6 retrieve and run applications from remote or local sources.

7 Data collected from the sensing device(s) in the form of  
8 digital images or translated to a decoded command may by  
9 transferred to the PC 65 via a METHOD AND SYSTEM OF BI-  
10 DIRECTIONAL PARALLEL PORT DATA TRANSFER BETWEEN DATA PROCESSING  
11 SYSTEMS as described in detail in U.S. Patent No. 5,600,793. This  
12 process transfers discreet packets of data both to and from  
13 peripheral devices. These devices would be in constant  
14 communication, allowing both the sensing device as well as the PC  
15 65 to send and receive data. Alternatively the data may be  
16 transferred via infra red, microwave or some other light  
17 frequency data transfer method. The user might also desire that  
18 the sensing device be manufactured in kind with the traditional  
19 television remote control device. This would re-enforce the  
20 desirability of the unit being manufactured in a wireless unit  
21 with a light emitting data transfer method as described above.  
22 This advantage would of course be balanced with the cost

1 effectiveness of the design, as well as the reliability of the  
2 data transfer via either method.

3 Reference is now made to Fig. 7, which depicts an embodiment  
4 of the invention adapted for commercial and shop-at-home  
5 applications. The customer views and interacts with a printed  
6 matter 70 (via sensors or a feature recognition units, both as  
7 previously described). Printed matter 70 is preferably a throw-  
8 away catalog or advertising brochure listing commercial items,  
9 such as programming choices, merchandise, travel or event  
10 schedules, or television and/or radio programming schedules. The  
11 user interacts with printed matter 70 (i.e., with certain  
12 features and/or sensors therein) to cause a coded signal 71  
13 indicative of the customer's selection to be transmitted (either  
14 by a transmitter embedded in the printed matter or within a  
15 feature recognition unit) to controller 73. In response thereto,  
16 controller 73 utilizes a modem/telephone (or other wired or  
17 wireless communication) link 74-75 to communicate the customer's  
18 selection to a commercial provider's remote office 78 (or to a  
19 centralized data bank or information superhighway).

20 The commercial provider preferably uses a "caller ID"  
21 function to identify the customer and can respond in a number of  
22 ways: (i) have a representative contact the customer; (ii) send

1 the ordered merchandise or tickets to the customer; (iii) direct  
2 a data server 72 to provide programming or additional promotional  
3 material via a CATV line 76 to controller 73, which replays the  
4 material on the customer's TV set; or (iv) download and execute  
5 an interactive merchandise selection program on the customer's  
6 personal computer or any other electronic media input, output or  
7 sensory stimulating device.

#### 8 9 THE APPARATUS PERSPECTIVE:

10 The various technologies used to implement the individual  
11 functional components that comprise a part of this invention are  
12 described below.

#### 13 14 TOUCH PAD TECHNOLOGY

15 Sensor 3 can be implemented using a wide variety of  
16 presently available touch sensitive pad technology. See, for  
17 example, U.S. Patent Nos. 5,016,008 entitled DEVICE FOR  
18 DETECTING THE POSITION OF A CONTROL MEMBER ON A TOUCH-SENSITIVE  
19 PAD, 5,012,124 entitled TOUCH SENSITIVE CONTROL PANEL, 4,862,151  
20 entitled REMOTE CONTROL DEVICE FOR A COMPUTER ASSOCIATED WITH A  
21 VIDEO SCREEN, 4,827,084 entitled SOLID STATE IMAGE DETECTOR AND  
22 SIGNAL GENERATOR and 4,644,101 entitled PRESSURE-RESPONSIVE

1 POSITION SENSOR, all of which are incorporated herein by  
2 reference.

3 Referring now to Fig. 2, a plurality of touch sensors 22 are  
4 embedded within the back binding of the printed matter 21.  
5 Alternatively, touch sensors 22 can be positioned along inner or  
6 outer margins of the binding, or of particular pages, of printed  
7 matter 21 (or along an edge of a mounting tray in which a  
8 disposable printed matter is placed). Electronics mounted within  
9 printed matter 21 (or within a mounting tray) responds to the  
10 actuation of a touch sensor 22 and transmits a coded signal  
11 indicative of the identity of the actuated sensor.

12 Advantageously, touch sensors can be combined with page  
13 sensors -- as described in U.S. Patent Nos. 5,209,665; 4,990,092;  
14 4,636,881 and 4,809,246, all previously incorporated herein -- to  
15 provide a larger number of "effective sensors." In this  
16 embodiment, each time a sensor is actuated, the electronics  
17 within the printed matter also checks the page sensor(s) to  
18 determine which page is currently being viewed. The electronics  
19 then generates a coded signal that identifies both the sensor  
20 actuated and the currently visible page. Thus, each (page,  
21 sensor) combination represents, in essence, a single "effective  
22 sensor."

1 Hybrid embodiments combining touch pads and page sensors are  
2 also possible. For example, a printed matter might contain a  
3 sheet of touch sensors every so many pages, with the page  
4 interval being dependent on the stiffness of the pages and the  
5 responsiveness of the sensors. That is, if the maximum number of  
6 pages through which a user's touch could be reliably detected by  
7 a touch sensor was X, then the printed matter would preferably  
8 include a sheet of touch sensors every X pages of text.

#### 9 10 INTELLIGENT CONTROLLERS AND DATA/COMMUNICATION SERVERS

11 In accordance with several embodiments of the invention, an  
12 intelligent controller controls the selection of programming in a  
13 video "file server" system. File servers are well known in the  
14 art. Generally, as used herein, the term intelligent controller  
15 can refer to computer equipment having either: (a) some type of  
16 mass storage device, typically a magnetic or magneto-optical  
17 disk, that is connected to a network and utilized as central  
18 storage for multiple users via the network; and/or (b) some type  
19 of network interface which allows establishment of a  
20 communication link with other user(s).

21 Referring to a "file server" type of intelligent controller,  
22 the information that is typically stored on such a system

1 consists of binary computer data such as executable programs and  
2 corresponding data. Exemplary of the types of corresponding data  
3 stored are numbers for spreadsheets, ASCII characters and codes  
4 for word processors, and drawing commands for drawing and CAD  
5 programs. These or similar types of data do not generally have a  
6 time element associated with them, nor do they generally require  
7 any extra processing beyond the usual interpretation that is  
8 accomplished by the computer program with which they are intended  
9 to be used.

10 In contrast, the playback of audio/video information has a  
11 time element associated with its use. Furthermore, the amount of  
12 data required to store audio/video program information in "raw"  
13 digital form is often prohibitive. Thus, it is common to employ  
14 audio/video compression techniques to compress audio/video  
15 program information before it is stored. As a result, further  
16 processing in the form of decompression and digital-to-analog  
17 conversion is required before the real-time viewing of an  
18 audio/video program can take place. Decompression may be  
19 accomplished through the use of known hardware or software  
20 techniques. Digital-to-analog conversion may be required,  
21 depending on the type of equipment used for viewing the  
22 audio/video program. A known audio/video file server apparatus

1 manufactured and marketed by Protocomm of Trevose, Pa. permits  
2 real-time playback of compressed audio/video program  
3 information.

4 Generally, modern audio/video file server systems include: a  
5 storage unit for centrally storing compressed digital audio/video  
6 program information, a transceiver for receiving compressed  
7 digital audio/video program information from an external source  
8 over a network (or wireless communication link) to update the  
9 stored audio/video program information, a plurality of playback  
10 units, each associated with an external playback line and an  
11 external playback station, each including a decompression unit,  
12 for receiving selected compressed digital audio/video program  
13 information from the storage unit, for decompressing the selected  
14 compressed digital audio/video program information received from  
15 the storage unit, and for playing it in real time over the  
16 associated playback line to the associated playback station, a  
17 network interface unit for receiving playback requests from the  
18 playback units, and a processor for controlling the storage and  
19 playback units to play the decompressed selected audio/video  
20 program information in real time for viewing by users at selected  
21 playback stations.

22 Such a system is described, for example, in U.S. Patent No.



1 5,262,875 entitled AUDIO/VIDEO FILE SERVER INCLUDING  
2 DECOMPRESSION/PLAYBACK MEANS, which is incorporated herein by  
3 reference. The '875 system can be adapted to operate in  
4 accordance with the present invention by coupling intelligent  
5 controller of the present invention with the '875 system's  
6 network interface unit (which provides the playback requests to  
7 the playback unit). In the '875 system:

8 "Playback may be initiated through a user  
9 request from one of the playback stations or  
10 through direct interaction with audio/video  
11 file server 5. In the latter case, a simple  
12 user interface, such as a menu interface,  
13 may be employed for selection of the desired  
14 program information and the playback  
15 station. For example, a menu of the available  
16 items of audio/video program information, as  
17 named by the user or by the system, may be  
18 presented. The user may make a selection  
19 through cursor control keys on a keyboard."  
20

21 In contrast, the present invention permits the user to select and  
22 control the presentation of audio/video programming through a  
23 familiar printed matter interface, as has been previously  
24 described. The present invention thus offers the advantage of  
25 nearly universal accessibility.

26 In accordance with the present invention, multimedia  
27 programming is preferably delivered from the file server(s) to  
28 the replay unit via an Integrated Service Digital Network (ISDN).

1 U.S. Patent No. 5,206,859 entitled ISDN MULTIMEDIA COMMUNICATIONS  
2 SYSTEM, incorporated herein by reference, describes such a  
3 system.

4 In accordance with the invention, a variety of means can be  
5 employed to communicate selection instructions to the video  
6 server and to communicate programming material from the server to  
7 the user's display unit. Since the selection instructions are  
8 very compact (i.e., low bandwidth), these instructions can be  
9 communicated via a standard telephone link using an inexpensive,  
10 low speed modem. This is similar, for example, to the method  
11 cable TV viewers use to select pay-per-view programming from  
12 local CATV companies -- i.e., the viewer calls a particular toll-  
13 free number associated with the desired program, and the CATV  
14 office uses a "caller ID" function to determine which customer is  
15 to receive the program.

16 Communication of the programming material from the server to  
17 the display unit may require a higher-bandwidth means. No doubt,  
18 certain material -- such as pricing information for a shop-at-  
19 home service or scheduling information for a travel booking  
20 service -- could be easily transmitted via an inexpensive  
21 telephone/modem link. In addition, using the preferred  
22 compression/decompression techniques, many multi-media

1 applications could also operate over a conventional telephone  
2 link. High quality audio/video programming, however, will likely  
3 require a higher bandwidth transmission medium, such as a CATV  
4 line, microwave link, DSB link, optical fiber link, cellular  
5 radio link, or enhanced bandwidth telephone connection.

6 Although the invention has been described above with  
7 reference to several presently preferred embodiments, such  
8 embodiments are merely exemplary and are not intended to define  
9 the scope of, or exhaustively enumerate the features of, the  
10 present invention. Accordingly, the scope of the invention shall  
11 be defined by the following claims. Where a feature or  
12 limitation of a preferred embodiment is omitted in a claim, it is  
13 the inventors' intent that such claim not be construed to  
14 impliedly require the omitted feature or limitation.